**Math F200: Final Exam Study Ideas** **December 1, 2004**

This list is intended as the start of a study guide. There is no guarantee that because a topic is listed here that it will be on the final, nor is there a guarantee that every problem on the final in represented in the list below. I've broken down the topics into three categories: problem solving, tasks, and basic computations. You can expect to find all of these categories represented on the final.

**Problem Solving**

- Related rates.
- Optimization problems.
- Finding volumes and areas using definite integrals.
- Use calculus ideas to help sketch the graph of a function.
- Other word problems, possibly involving the tasks below.

**Tasks:**

- Find critical points/local extrema/points of inflection of a function.
- Compute a rate of change using derivatives.
- Use a position function to compute a velocity, or vice versa.
- Compute an acceleration from a velocity or compute a velocity knowing an acceleration.
- Use the linearization to compute approximate values of a function.
- Find the tangent line to the graph of a differentiable function, or maybe even an implicitly defined function.
- Find the second derivative of an implicitly defined function, or the derivative of an inverse function.
- Apply one iteration of Newton's method by hand.
- Use the chain rule and fundamental theorem of calculus combined, e.g $\frac{d}{dx}\int_x^{x^2}\sin(s)ds$.
- Find the net change of a function using an integral.
- Determine if a piecewise defined function is continuous.
- Write down an approximation of a definite integral using a Riemnann sum.
- Identify the limit of a Riemann sum as a definite integral.
- Compute limits using l'Hôpital's rule. Know when you can use l'Hôpital's rule and when you can't.
- Compute vertical and horizontal asymptotes using limits.
- Compute a derivative from the definition using limits.

**Computations:**

- The Chain Rule.
- The Product and Quotient Rules.
- Derivatives of exponential/trig/logarithmic/inverse trig functions.
- Implicit differentiation.
- Integration via substitution.
- Basic indefinite integrals.
- Standard limits.
- Limits at infinity or infinite limits.